

Course Number: **MECH 3200**
Semester: **SPRING, 2012**
Course Title: **Design Methodology** (formerly, Concepts in Design and Manufacturing)
Credit Hours: 2 (LEC 2)
Prerequisites: MECH 2110 (grade of C or better); w/coincidence: MECH 2220

Lecture Schedule

WF 8:00 to 8:50 a.m., Shelby 1126

Instructor

Dr. Peter D. Jones, Mechanical Engineering Dept., Wiggins 3418G, (334) 844-3368,
pjones1@auburn.edu , Office Hours WF 9:00 a.m. to 11:00 a.m.

Teaching Assistant

Mr. David M. McIntyre, Mechanical Engineering Dept., Wiggins 2454, mcintdm@auburn.edu,
Office Hours TR 9:30 am to 11:00 am.

Course Objectives

Upon completion of this course, the student will be able to:

1. Design a simple mechanical product using a formal process of problem definition, specification establishment, concept generation and evaluation, and product development. (Program Outcome 4)
2. Communicate design and production process for a simple mechanical product. (P.O.6,8)
3. Demonstrate the design project skills that will be more fully developed and exercised in the Comprehensive Design series (MECH 4240/50).

Course Outcomes

In order to learn the course material, students will:

1. Study the specified textbook on the design process methodologies and perform a series of familiarization exercises. (Course Objective 1)
2. Perform a complete, team-based product design for a simple mechanical device, including goals, requirements, alternatives, assessment, embodiment, and manufacturing plan. (C.O.1)
3. Report results of studies and projects in clear, concise, and presentable formats. (C.O.1,2,3)

Website

All course materials will be posted on <http://www.eng.auburn.edu/~pjones/mech3200.htm>

Note that this is **NOT** Blackboard or Canvas

Textbook

Eggert, R.J., 2010, *Engineering Design*, High Peak Press.

Recommended Reading

Chiles, J.R., 2001, *Inviting Disaster – Lessons from the Edge of Technology*, Harper Collins.
(Lots of stories about broken machines)

Johnson, S.B., 2002, *The Secret of Apollo – Systems Management in American and European Space Programs*, Johns Hopkins.

(Excellent study on project management of complex systems)

Pahl, G., W. Beitz, J. Feldhusen, & K.H. Grote, 2007, *Engineering Design – A Systematic Approach*, 3rd ed., Springer.

(Very difficult. But the most authoritative source in Design Methodology)

Paley, S.J., 2010, *The Art of Invention*, Prometheus Books.

(one of many of this type, but more concise and engineeringish than most)

Ullman, D.G., 2010, *The Mechanical Design Process*, 4th ed., McGraw-Hill.

(Most accessible. Good ‘alternate point of view’ to text)

Deliverables

Homework

Homework assignments are expected to be individual and original, although consultation between students is allowed and encouraged. Homework results will be submitted as brief, free-standing technical memoranda that present and defend an argument in text, with supporting calculations and graphics. Homework submissions should be printed neatly or typed.

Homework will be assigned weekly before midterm, and not at all afterwards (the time to be spent on the Team Design Project).

Examination

Midterm - 50 min. Closed book and notes, with the exception of both sides of one 8½ × 11 inch sheet, any font or margins. A calculator might be necessary, so be sure to bring one.

Examination Rules:

- All exam-specific rules (printed on the first sheet of the exam) must be followed.
- Students may not leave the room of a timed exam without permission. If a student does so, then the exam will be considered turned in at the time the student leaves the room.

Project

Major Project. Students will work in small, self-selected teams of approximately four persons to complete the design process for a mechanical device solution to a design problem. All teams will work to solve the same design problem. Teams will not actually fabricate their design for MECH 3200 credit. Teams will meet periodically with the instructor to review their progress throughout the design process. Teams will detail the results of their study in a written report. Both the periodic reviews and the final report will be used to grade the project effort.

Grading Weights

Homework	25%
Exam	25%
<u>Project</u>	<u>50%</u>
Total (max possible)	100%

Grading Scale

<u>Total (achieved)</u>	<u>Grade at least</u>
90%	A
80%	B
70%	C
60%	D
0%	F

Academic Honesty Policy

All portions of the Auburn University student academic honesty code (Title XII) found in the Tiger Cub will apply to university courses. All academic honesty violations or alleged violations of the SGA Code of Laws will be reported to the Office of the Provost, which will then refer the case to the Academic Honesty Committee.

Attendance

Although attendance is not required, students are expected to attend all classes, and will be held responsible for any content covered in the event of an absence.

Behavior

Professional behavior is expected of all course participants.

Contingency

If normal class and/or lab activities are disrupted due to illness, emergency, or crisis situation (such as an H1N1 flu outbreak), the syllabus and other course plans and assignments may be modified to allow completion of the course. If this occurs, an addendum to your syllabus and/or course assignments will replace the original materials.

Disability Accommodation

Students who need special accommodations in class, as provided for by the Americans With Disabilities Act, should arrange for a confidential meeting with the instructor during office hours in the first week of classes (or as soon as possible if accommodations are needed immediately). The student must bring a copy of their Accommodation Letter and an Instructor Verification Form to the meeting. If the student does not have these forms, they should make an appointment with the Program for Students with Disabilities, 1288 Haley Center, 844-2096 (V/TT).

Evacuation

Should an unsafe environment develop in any class meeting room, design space, or shop facility, all class participants must proceed immediately outdoors, or to a designated safe area. Dismissal by the instructor is not necessary (i.e., establish your safety first – we'll worry about attendance afterwards).

Excused Absences

Students are granted excused absences from class for the following reasons: illness of the student or serious illness of a member of the student's immediate family, death of member of student's

immediate family, trips for student organizations sponsored by academic unit, trips for university classes, trips for participation in intercollegiate athletic events, subpoena for a court appearance, and religious holidays. Students who wish to have an excused absence from class for any other reason must contact the instructor in advance of the absence to request permission. The instructor will weigh the merits of the request, and render a decision. When feasible, the student must notify the instructor prior to the occurrence of any excused absences, but in no case shall such notification occur more than one week after the absence. Appropriate documentation for all excused absences is required. See the Tiger Cub for more information on excused absences.

Make-Up Policy

Arrangement to make up a missed major examination (e.g.: hour exams, mid-term exams) due to properly authorized excused absences must be initiated by the student within one week of the end of the period of the excused absence(s). Except in unusual circumstances, such as the continued absence of the student or the advent of university holidays, a make-up exam will take place within two weeks of the date that the student initiates arrangements for it. Except in extraordinary circumstances, no make-up exams will be arranged during the last three days before the final exam period begins.

Tentative Schedule

Wednesday	Friday
<u>11 Jan</u> Subject: Introduction to Engineering Design	<u>13 Jan</u> Subject: Design problem formulation Reading: Eggert Chap.1,2,3
<u>18 Jan</u> Subject: MWC Intro; Concept generation Reading: Eggert Chap.4	<u>20 Jan</u> Subject: Decision processes Due: Homework Chap.1,2,3
<u>25 Jan</u> Subject: Technical writing session 1 Reading: Eggert Chap.5,6	<u>27 Jan</u> Subject: Materials, manufacturing, and cost Due: Homework Chap.4
<u>1 Feb</u> Subject: Configuration design Reading: Eggert Chap.7,8,9	<u>3 Feb</u> Subject: Parametric design Due: Homework Chap.5,6
<u>8 Feb</u> Subject: Design check - DFX Reading: Eggert Chap.10	<u>10 Feb</u> Subject: Technical writing session 2 Due: Homework Chap.7,8,9
<u>15 Feb</u> Subject: Detail design Reading: Eggert Chap.11,13	<u>17 Feb</u> Subject: Human factors (guest lecture) Due: Homework Chap.7,8,9 rewrite
<u>22 Feb</u> Subject: Design project management Reading: Eggert Chap.14	<u>24 Feb</u> Subject: Review Due: Homework Chap.10,11,13
<u>29 Feb</u> Midterm Exam	<u>2 Mar</u> Subject: Team Project organization
<u>7 Mar – 25 Apr</u> Due: Team Project progress meetings	<u>27 Apr</u> Due: Team Project written report